REMARKS

The Examiner's Action mailed on August 1, 2007, has been received and its contents carefully considered.

Claim 1 is the sole independent claim, and claims 1-7 remain pending in the application. For at least the following reasons, it is submitted that this application is in condition for allowance.

Claims 1 and 2 were rejected under 35 USC §102(b) as anticipated by *Kane* (US 4,381,566). This rejection is respectfully traversed.

Kane discloses a dipole antenna using a pair of distributed constant inductance elements, and considers the impedance of the whole antenna. On the contrary, the present invention discloses a variable tuning antenna in a wide band range using an antenna element and a tuning circuit. So, the structure of antenna system is entirely different.

In the present invention, FIG. 1 represents an illustrative example in which an antenna **2** is tuned by adjusting a voltage controlled capacitor **122** (or **C**), which together with an inductor **121** (or L_2) forms part of a parallel LC circuit **12** connected in series with the antenna **2**, and the frequency range that can be covered by varying the value of **C** is extended by adding a further inductor **11** (or L_1) between the parallel LC circuit **12** and the antenna **2**, and by meeting certain conditions.

An important one of those conditions is setting a combined reactance of the radiation element and the first inductance element and a combined reactance of the parallel circuit to be canceled by each other and allowing the antenna to resonate in a wide frequency band by the use of the second inductance element L_2 of the parallel circuit, by inserting the second inductance element L_2 directed to a broadband in parallel with the capacitance element **C** while performing tuning with the antenna making series resonance, in order to achieve tuning even in a broad band of frequencies such as a frequency band employed by digital TVs (see ¶¶ [0029] and [0030] and Eq. (7)).

Claim 1 therefore recites that "the tuning circuit is set so that a combined reactance of the radiation element and the first inductance element and a combined reactance of the parallel circuit are canceled by each other".

However, Kane does not teach or suggest this feature.

The reference numbers used in the Office Action for elements in Kane that allegedly correspond to the claimed elements of the invention actually refer to the embodiment of FIG. 36 of *Kane*. However, the parts of *Kane*'s specification that the Office Action cites from column 5 refer to the embodiments of FIG. 3 and FIG. 6 instead. The embodiments of FIG. 3 and FIG. 6 are very different from that of FIG. 36, which is actually described not in column 5, but from column 14, line 45 to column 15, line 36. Whilst the Office Action has identified elements in FIG. 36 allegedly corresponding to each element recited in the present claim 1, it would not be possible to do so for FIG. 3 or FIG. 6 of *Kane*.

More specifically, whereas claim 1 recites "a tuning circuit connected to the radiation element in series, the tuning circuit comprising a first inductance element and a parallel circuit which is connected to the first inductance element in series", if, for example, unit **10** or **15** were said to correspond to the radiation element in FIG. 3 or FIG. 6 respectively, there would be nothing that would correspond to the claimed "first inductance element", assuming that the parallel circuit comprised coil **11** or **16** and variable condenser **12** or **17** respectively.

Thus, there is also nothing in the description of FIG. 3 or FIG. 6 stating that the combined reactances of a radiation element and of an inductance element are cancelled by the reactance of the parallel circuit, i.e. there is no teaching or suggestion that "the tuning circuit is set so that a combined reactance of the radiation element and the first inductance element and a combined reactance of the parallel circuit are canceled by each other".

Instead, *Kane* only states in column 5, lines 44-53 that:

> As seen from the above, this invention makes it possible to design the antenna, which is very small in length in comparison with the wave length of the frequency in use and tunable at an individual frequency with respect to the whole zone or range of desired frequencies, and which is of *elements having negative reactances* which are small enough and having very small losses; the invention includes *positive reactance control circuits which are small enough to offset the above-noted negative reactance components* and yet have small losses.

The word "offset" does not necessarily mean to cancel, but merely that the effect of the positive reactance is to reduce the negative reactance of the element by some amount. Hence, *Kane* is ambiguous as to whether the negative

reactance is cancelled or merely reduced. Although an applicant may be his or her own lexicographer, there is no indication as to what particular meaning of the word "offset" was intended in *Kane*, and whilst the Office Action may apply the "broadest reasonable interpretation" to the claims, this principle may not be applied to cited references, which must be held to what they actually disclose.

Hence, if this statement had been made referring to an embodiment that actually showed all the elements recited in claim 1, which it was not, it would still not anticipate the above-recited feature of claim 1.

Regarding the embodiment of FIG. 36 of *Kane*, the tuning antenna system comprising a pair of parallel antennae (first parallel antenna: **127** to **131**, **135** to **139**; second parallel antenna: **127'** to **131'** , **135'** to **139'**) . Each one of the parallel antennae comprises a radiation element (**127**, **127'**) , a first inductive element (**130**, **131**, **130'**, **131'**) in series with the radiation element, a parallel circuit of a second inductive element (**136**, **136'**) and a variable capacitance (**137**, **137'**), the parallel circuit being in series with the first inductive element .

The impedance of the first parallel antenna and the impedance of the second parallel antenna are matched with each other (see FIG. 38(a), curves **D** and **E** having a section point at frequency f1) via the respective parallel circuits (i.e. tuning circuits) (**141**, **141'**) comprising the variable capacitances (**137**, **137'**) and further comprising an impedance adjusting capacitance (**140**) (see FIG. 36 and 38(a)).

That is, in the embodiment of FIG. 36, *Kane* merely discloses matching the impedance of the first parallel antenna *as a whole* (see curve D of FIG. 38(a)) against the impedance of the other parallel antenna *as a whole* (see curve E of FIG. 38 (a)).

Consequently, there is no teaching or suggestion in *Kane* that "the tuning circuit is set so that a combined reactance of the radiation element and the first inductance element and a combined reactance of the parallel circuit are canceled by each other" as recited in claim 1.

Further, in the present invention the parallel circuit is set to prevent the antenna from resonating in a desired frequency band. That is, the parallel circuit is prevented from becoming a parallel resonance circuit. *Kane* does not disclose this point, i.e. there is no teaching or suggestion in *Kane* that "the parallel circuit does not resonate in a desired receiving frequency band" as recited in claim 1.

The Office Action asserts that "it is well known that the parallel circuit alone will not resonate in the frequency band of the antenna, where the frequency band is determined by inductor '131' combined with the parallel circuit". This ignores the contribution of the radiating element and treats only the reactances of the discrete circuit components as affected the tuned frequency of the antenna, which is prima facie incorrect, and also appears to imply that it is not possible for the parallel circuit to resonate at the same frequency as the tuned antenna, which is also not correct, i.e. it is certainly quite possible to choose values of inductance and capacitance for the tuning components that, when combined with a particular

value of the inductance of the radiation element, will cause the tuned antenna and the parallel circuit to have the same resonant frequency.

Further, the various Smith charts shown in *Kane* fail to include an impedance plot of the parallel circuit by itself in any embodiment, only impedance plots of the parallel circuit combined with other components, so there is no impedance plot showing a parallel circuit by itself resonating outside the desired frequency band.

Kane therefore fails to teach or suggest all the features recited in claim 1. Thus, claim 1 patentably defines over *Kane*, and is allowable, together with claims 2-7 that depend therefrom.

Claim 3 was rejected under 35 USC §103(a) as obvious over the combination of *Kane* with *Kanayama et al.* (US 5,861,859). This rejection is respectfully traversed.

Kanayama et al. discloses an antenna that includes a rod antenna that can be housed in a housing body and pulled out from the housing body and a helical antenna, so that the rod antenna is pulled out to improve sensitivity at the time of communication, and usually the rod antenna is housed and the helical antenna receives signals. Both the antennas transmit and receive signals in the same frequency band, and are different from the antenna according to the present invention, which is configured to have different frequency bands for the tuning frequency band by the first antenna element and the second antenna element and the frequency band tuned only by the first antenna element. That is, *Kanayama et*

al. fails to teach or suggest that the first and second antenna elements are formed "so as to resonate at a first frequency band of a wide band in the desired frequency band with the tuning circuit, and so as to resonate at a second frequency band by only the first antenna element".

Further, claim 3 depends from claim 1, and as *Kanayama et al.* fails to remedy the deficiencies of *Kane* with respect to claim 1, claim 3 is also allowable for at least this reason.

Claims 5-7 were rejected under 35 USC §103(a) as obvious over the combination of *Kane* with *Kanayama et al.* and *Makino* (US 5,446,469). This rejection is respectfully traversed.

Makino discloses an antenna similar to that of *Kanayama et al.*, but the helical antenna is formed to be a 1/2 wavelength antenna because the sensitivity of the helical antenna (conventionally, a 1/4 wavelength antenna) is low when a whip antenna is housed, and both the antennae transmit and receive signals in the same frequency band. Since both the antennas are connected in parallel to a matching circuit when the whip antenna is extended, in the total antenna the characteristics of the whip antenna are predominant, and thus the frequency band can be enlarged (see Fig .3 and column 2, line 59 to column 3, line 5).

That is, *Makino* does not disclose nor even suggest the third antenna element that is tunable in a third frequency band, i.e. *Makino* fails to teach or suggest "the third antenna element comprises an antenna resonating at a third frequency band different from that of the variable tuning antenna, so that two

frequency bands of a first frequency band of a wide band obtained by the variable tuning antenna and the third frequency band can be transmitted and received" as recited in claim 5.

Claims 5-7 also depend from claim 1, and as *Kanayama et al.* and *Makino* fail to remedy the deficiencies of *Kane* with respect to claim 1, claims 5-7 are also allowable.

No specific rejection of, or objection to, claim 4 appears in the body of the Office Action, which nonetheless alleges on page 6 thereof that the limitation of claim 4 is not entitled to patentable weight on the ground that it merely recites an intended use, although claim 4 is listed as rejected in the summary of the Office Action. Any such rejection or objection is respectfully traversed or requested to be withdrawn as appropriate.

It is incorrect to assert that claim 4 merely recites an intended use, as claim 4 does not recite digital TV as an intended use, but in fact recites that the first frequency band is a frequency band of a digital TV. It is respectfully submitted that either claim 4 should be allowed or a specific rejection or objection should be made thereto.

It is submitted that this application is in condition for allowance. Such action and the passing of this case to issue are requested.

Should the Examiner feel that a conference would help to expedite the prosecution of this application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

Should any fee be required, however, the Commissioner is hereby authorized to charge the fee to our Deposit Account No. 18-0002, and advise us accordingly.

Respectfully submitted,

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Date

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